Remarks

I. Introduction

This is in response to the Office Action dated June 18, 2006. The Office Action rejected claim 16 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Office Action also rejected claims 1-27 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,985,928 ("Zhang").

Claims 1, 6, 11, 16-18, 21, 23, and 27 have been amended. No new matter has been added by these amendments. Claims 22 and 24 have been canceled without prejudice. Claims 1-21, 23, and 25-27 remain for consideration, of which claims 1, 11, and 16 are the only independent claims.

II. Rejections under 35 U.S.C. §112

Claim 16 stands rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Accordingly, Applicants have amended 16. Amended claim 16 now recites:

> A node for a peer-to-peer network comprising:
> a number of real storage slots for storage of objects having a real capacity; and
> a number of virtual storage slots having a virtual capacity wherein a total capacity of the real and virtual storage slots combined exceeds actual physical storage capacity of the node.

Applicants have amended claim 16 to define the relationship of the real and virtual slots and their capacities as they relate to the total capacity of the node in accordance with the directions of the current Office Action. For example, a node may have three real storage slots and two virtual storage slots. If each real and virtual slot has a capacity of 100GB, the node appears to have 500GB of storage, though only 300GB of storage capacity (e.g., in the real slots) is actually available. The current Office Action, in section 2, posits "if the node has a capacity of 8 slots, it is not clear how that number

relates to a storage capacity." In such a situation, if the 8 slots comprised 5 real slots and 3 virtual slots, each with a capacity of 100GB, the storage capacity of the node would be 500GB, though the node would "pretend" to have 800GB capacity.

Support for these amendments may be found in Applicants' Specification at least at paragraphs [0021] and [0022]. No new matter has been added by these amendments. Applicants respectfully request the Examiner withdraw this rejection in view of the current amendments.

III. Rejections under 35 U.S.C. §102(e)

Claims 1-27 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,985,928 ("Zhang"). Applicants respectfully traverse these rejections. However, solely to expedite prosecution, Applicants have amended claims 1, 6, 11, 16-18, 21, 23, and 27. No new matter has been added by these amendments.

In order for a claim to be anticipated under 35 U.S.C. §102, **each and every** limitation of the claim must be found either expressly or inherently in a single prior art reference. PIN/NIP, Inc. v. Platte Chem. Co., 304 F.3d 1235, 1243 (Fed. Cir. 2002). In the present case, Zhang does not show each and every limitation of claims 1-27. Therefore, applicants request the withdrawal of the rejection under 35 U.S.C. §102(e).

With respect to claims 1-15, 21, 23, and 25-26, Applicants respectfully submit the rejection of independent claims 1 and 11 and their dependent claims is based on erroneous characterizations of Zhang and Zhang does not teach or disclose the features of the present invention as they are actually claimed. Applicants have only amended claims 1, 6, 11, 21, and 23 to clarify these features and highlight the differences between the present claims and the prior art.

Amended independent claim 1 recites, among other things "hosting one or more storage slots in each node in the peer-to-peer network, a first portion of the storage slots hosting storage zones and any remaining storage slots at each node allocated as a free slot reserve storage slot" and "when a storage slot hosting a storage zone reaches a full capacity of the storage zone, splitting the data in the storage slot hosting the storage zone into a first and second portion, converting a free slot reserve storage slot into a new storage slot hosting a storage zone, and transferring the second portion of the data to the

new storage slot hosting the storage zone." Support for these amendments may be found in Applicants' Specification at least at Paragraphs [0013] and [0017]. Independent claim 11 recites similar features, specifically "when a new node is added to the peer-to-peer network, transferring at least one storage zone from another node in the peer-to-peer network to the new node such that a storage slot of the new node hosts the transferred storage zone so as to maintain at least one storage slot hosting at least one storage zone at each node in the peer-to-peer network."

To show "*hosting one or more storage slots in each node* in the peer-to-peer network, a first portion of the *storage slots hosting storage zones* and any remaining storage slots at each node allocated as a free slot reserve storage slot" (emphasis added) as recited in amended independent claim 1, the current Office Action again points to Zhang at least at col. 2, lines 27-42, col. 3, line 47-col. 4, line 54, "p2p system consisting of nodes being in storage zones" (Office Action, section 4). Further, in the Response to Arguments, the current Office Action states that Applicants argue the Zhang does not place storage zones within a node and goes on to state "While this interpretation is presented in the claims, the claim is up to interpretation." Applicants respectfully submit that amended independent claims 1 and 11 clearly recite that each node hosts storage slots ("hosting one or more storage slots in each node") which, in turn, host zones ("storage slots hosting storage zones") and this is not up to interpretation.

Further, Applicants respectfully submit that several definitions and points of the invention have been confused in the current Office Action. First, in section 5a the current Office Action incorrectly characterizes the claim limitation "a first portion of the storage slots hosting storage zones and any remaining storage slots at each node allocated as a free slot reserve storage slot" recited in amended independent claim 1 and similarly in amended independent claim 11. In Applicants' claims, each slot hosts a zone and thus cannot be spread among three nodes as suggested by the current Office Action.

Second, despite the Examiner's continued restatement to the contrary, the Specification provides a clear definition of "zones" in paragraph [0013] – "Each *zone is a subspace of the hashkey space* which is *hosted at a particular slot* in a particular physical node" (emphasis added) – and that Zhang defines zones differently. See, for example,

Zhang's Abstract. Thus, relying on sections of Zhang that discuss "zones" represents mischaracterization of the reference.

Third, in section 5d, the current Office Action asserts that "the term 'slot' is used interchangeably with zone" and "it being implied a slot is part (whole or in part) of the zone." Applicants point out that this is NOT implied or stated anywhere in Applicants' Specification. The term slot is not used "interchangeably" with zone, but may be substituted in some cases because a slot hosts a zone, which substantially fills the slot, as discussed above. As described above and defined in the specification, "slot" and "zone" are not identical. For example, as pointed to by the current Office Action, paragraph [0019] states "every node in the system hosts at least one zone (one allocated slot)." That is, every node hosts a slot that hosts a zone.

Fourth, the current Office Action, in section 5b of the Response to Arguments, also incorrectly states "Zhang's system is structurally the same as the zone would be divided into two subzones." As shown above, Zhang's zones refer to a grouping of nodes in a peer-to-peer network, NOT to the actual structure of the nodes as in Applicants' claims (e.g., "hosting one or more storage slots in each node in the peer-to-peer network, a first portion of the storage slots hosting storage zones and any remaining storage slots at each node allocated as a free slot reserve storage slot"). Inexplicably, the current Office Action states that the "Examiner fails to see the relevancy as the where the zones are described in the specification of the corresponding applications." Applicants respectfully submit that this is very relevant. Applicants have clearly defined "zones" in the Specification (discussed above) and highlighted this in the claims. Zhang defines "zones" in the reference and shows examples of "zones" in the corresponding figures. Further, Applicants have quoted both Applicants' Specification and Zhang and have shown that even though Zhang uses "zones", the reference does not describe Applicants' claim limitations, especially not "a first portion of the storage slots hosting storage zones." Though Zhang and the present invention both use the word "zones," they DO NOT HAVE THE SAME DEFINTION and are not the same features in structure, form, or use. They are different concepts, wherein the 'Zhang zones' are described at least in the first sentence of Zhang's summary and Applicants' zones are described throughout the Specification, specifically in Paragraph [0013].

As Applicants have stated in prior responses, even if Zhang shows "p2p system consisting of nodes being in storage zones," this is NOT what is claimed by Applicants. Rather, Applicants claim a method in which zones are *hosted IN slots*, where the slots are *hosted IN nodes*. See, for example, Applicants' Specification at least at Paragraphs [0004], [0013], [0017], and [0022] and FIGS. 1 and 2 and discussion in the next paragraph.

Zhang is directed to peer-to-peer system based on a zoom-in algorithm wherein the zoom-in algorithm groups nodes into zones, where the nodes contain objects. See, for example, Zhang, Col. 3, lines 55-56 and FIGS. 2A and 2B. The zones of Zhang are different from the present invention in that Zhang's zones are *groupings of nodes*, not "*a subspace of the hashkey space* which is *hosted at a particular slot* in a particular physical node" as defined by Applicants' Specification. Therefore, Zhang does not address the zones (as clearly defined by and claimed by Applicants) for use in the methods of independent claims 1 and 11.

Accordingly, Zhang does not and cannot anticipate Applicants' amended independent claims 1 and 11. The rejection of claims 1-27 is therefore improper as the Office Action has not addressed Applicants' claims as actually written (either before or after amendment of the same). Applicants respectfully request the Examiner reconsider and withdraw this rejection.

Still further, Claim 1 has also been amended to recite "when a storage slot hosting a storage zone reaches a full capacity of the storage zone, splitting the data in the storage slot hosting the storage zone into a first and second portion, converting a free slot reserve storage slot into a new storage slot hosting a storage zone, and transferring the second portion of the data to the new storage slot hosting the storage zone." The Office Action does not address the structure of a free slot reserve storage slot in Zhang as Zhang does not have this structure. As discussed above, Zhang is directed to a global system and does not address the structure of the nodes beyond stating that the nodes may store objects. Accordingly, as the free slot reserve storage slot is absent from Zhang and unaddressed by the Office Action, the method steps of "converting a free slot reserve storage slot into a new storage slot hosting a storage zone" and "transferring the second

portion of the data to the new storage slot hosting the storage zone," as claimed in Applicants' amended independent claims 1 and 11 are not met by the prior art.

Also, Applicants' independent claim 1 recites "when a storage slot hosting a storage zone reaches a full capacity of the storage zone, splitting the data in the storage slot hosting the storage zone into a first and second portion." Applicants submit Zhang does not show this claim feature. Section 4 of the current Office Action points to Zhang, Col. 3, line 47 to Col. 4, line 54, stating "parent zone split into two subzones, zones being overcrowded – placing (converting) object in other (new) subzone)." Applicants · respectfully submit that statement is unclear, but have read this section of Zhang and have attempted to reconcile it with the current Office Action's "sentence." Further, Applicants submit that neither this nor any other section of Zhang shows "splitting the data" as claimed in amended independent claims 1 and 11. In fact, Zhang merely . teaches that "a new and less crowded subzone may be created for placing new objects of the sub-tree that otherwise would fall into the over crowded area" (Zhang, Col. 4, lines 25-28) when a sub-tree is overcrowded. That is, when an area (Zhang's subzone) fills, a new subzone is created and *new* data is placed in the new subzone. Zhang does not teach "splitting the data" "when a storage slot hosting a storage zone reaches a full capacity" as recited in Applicants' amended independent claims 1 and similarly in amended independent claim 11.

Dependent claims 6, 21, and 23 are amended to bring the claim language in line with amended independent claims 1 and 11. The particular inventive features of claim 2 are discussed further below with respect to amended independent claim 16. Though dependent claim 2 does not depend from independent claim 16, claim 2 recites features similar to those recited in claim 16, specifically "each node is assigned more storage slots than its actual physical capacity allows."

Zhang does not teach or suggest all claim features of independent claims 1 and 11. Dependent claims 2-10, 12-15, 21, 23, and 25-26 depend from these claims and therefore inherit the features not shown by Zhang. Accordingly, Applicants respectfully request the Examiner reconsider and withdraw these rejections.

Dependent claims 3 and 13 recite additional allowable features. In the rejection of claim 3, the current Office Action points generally to Col. 3, line 47 to Col. 4, line 54

of Zhang to show "wherein each node is allocated N – 1 virtual slots for each N storage slots allocated." Applicants respectfully submit that Zhang shows no such feature. First, Zhang does not teach or disclose any "virtual" slots or anything that could be construed to show this. Second, nowhere in the section or any other section are algebraic expressions of two types of slots shown or discussed. Applicants respectfully submit that no reasonable attempt was made to show this feature and a general section of Zhang was pointed to. This rejection is improper and should be withdrawn.

Similarly, in the rejection of claim 13, the current Office Action generally points to the same section of Zhang with the solitary note "parent zone" without any further exposition. First, Zhang does not teach or disclose an "eagerly split zone" as claimed and no credible attempt is made to show such a feature. Second, nowhere in the section or any other section is there any discussion of limiting the zones within a node as claimed in dependent claim 13. This rejection is improper and should be withdrawn.

With respect to independent claim 16, Applicants have amended the claim to more clearly recite:

> A node for a peer-to-peer network comprising:
> a number of real storage slots for storage of objects having a real capacity; and
> a number of virtual storage slots having a virtual capacity wherein a total capacity of the real and virtual storage slots combined exceeds actual physical storage capacity of the node.

Support for this amendment may be found in Applicants' Specification at least at Paragraphs [0005], [0017] and [0022]. Specifically, the concept of oversubscription in claim 16 is discussed, wherein "[e]ach node would have a number of actual slots which amount to its actual physical capacity and a number of 'virtual slots'" and "[t]he physical nodes preferably arrange their storage capacity in what the inventors refer to as a number of slots whose number can be roughly proportional to the amount of storage available to the physical node." Each slot has a *SlotSize*, where "*SlotSize* is a system-wide constant representing the limit size to which a zone can grow before it fills the slot." As seen here, the *SlotSize* is the filling point of the slot (e.g., the capacity of the slot). Since the node may have "a number of actual slots which amount to its actual physical capacity and a number of 'virtual slots' and each slot has a capacity *SlotSize*, the total capacity of the

actual slots and the virtual slots will exceed the capacity of the node (e.g., the capacity total if only the actual slots are considered). An example of this is described in Paragraph [0022] and shown in FIG. 2.

The current Office Action points to Zhang, Col. 4, line 39-Col. 5, line 34 and the generic "storage utilization" to show the features of claim 16. However, this section of Zhang and the generic idea of "storage utilization" do not address the features of claim 16. Specifically, Zhang does not disclose "virtual slots" or "a total capacity of the real and virtual storage slots combined exceeds actual physical storage capacity of the node." Again, see Zhang's FIGS. 2A and 2B, which shows objects in nodes, the nodes in 'Zhang zones', but does not show storage slots hosted by nodes. Further, this section of Zhang only discusses determining a storage utilization. Specifically, Zhang states, "For example, the node 110b may periodically compute storage utilization, using known techniques, and store it in memory. The storage utilization includes the memory capacity being used to store objects in a node at a given time." (Zhang, Col. 5, lines 15-19). Zhang, neither in the section cited by the Office Action nor anywhere else, discloses "wherein a total capacity of the real and virtual storage slots combined exceeds actual physical storage capacity of the node" as recited in amended claim 16.

Therefore, as Zhang fails to teach or suggest all claim features of Applicants' independent claim 16, the rejection is improper and should be withdrawn.

Further, section 5d of the Response to Arguments section of the current Office Action re-copies the prior argument stating "Zhang teaches the 'slots' and allocating more storage slots than its actual physical storage capacity as Zhang teaches the storage capacity and utilization may be over 80% (see col. 5, lines 11-23), and as seen from the specification of the current invention that over a 50% utilization results in the oversubscription desired of the invention (see par.23)."

First, as discussed above, Zhang does not teach or suggest a "virtual slot" and therefore does not teach allocating more storage slots than its actual physical storage capacity. Second, the Office Action again mischaracterizes Applicants' Specification, specifically Paragraph [0023]. Applicants respectfully submit that Applicants' most recent arguments were not even addressed as this section of the current Office Action is an exact copy of prior comments even though claim 16 had been amended.

Paragraph [0023] discloses "Oversubscription advantageously allows the achievement of utilizations higher than 50%." As one of skill in the art will recognize, *allowing* achievement of utilizations higher than 50% is not the same as stating that "over a 50% utilization *results* in the oversubscription desired of the invention." (emphasis added). As discussed above, oversubscription is detailed in Applicants' Specification at least at Paragraphs [0005], [0017] and [0022] and refers to having a node with a number of real slots and a number of virtual slots in a node, such that the total capacity of the real plus virtual slots is greater than the actual capacity of the node. In this way, the node is oversubscribed.

Zhang does not teach or suggest all claim features of independent claim 16. Dependent claims 17-20 depend from this claim and therefore inherit the features not shown by Zhang. Accordingly, Applicants respectfully request the Examiner reconsider and withdraw these rejections.
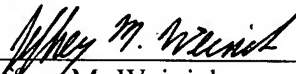
Dependent claims 17 and 18 are amended to bring the claim language in line with amended independent claim 16. These amendments are not meant to limit the scope of the claims. Further, in the rejection of claim 17, the current Office Action points generally to Col. 3, line 47 to Col. 4, line 54 of Zhang to show "where the number of real and virtual storage slots combined maintained by the node is equal to 2xN-1 where N is a number of real storage slots that would fill the node's actual physical storage capacity." Applicants respectfully submit that Zhang shows no such feature. First, Zhang does not teach or disclose any "virtual" slots or anything that could be construed to show this. Second, nowhere in the section or any other section are algebraic expressions of two types of slots shown or discussed. Accordingly, Zhang does not teach or disclose the limitations of claim 17 and Applicants request the Examiner reconsider and withdraw the §102 rejection.

IV. Conclusion

For the reasons discussed above, the presently pending claims are patentable over the prior art. Further, these claims are presented in proper form for allowance. For these reasons, Applicants request withdrawal of the §112 and §102(e) rejections.

Reconsideration and allowance of all claims is respectfully requested.

Respectfully submitted,

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October 18, 2007
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